Claims

Claims 1 - 32 (cancelled)

33. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, and the second chamber has a downstream portion that extends below the passageway and asymmetrically surrounds the downstream portion of the first chamber.

34. (New) A degassing device according to claim 33, wherein the downstream portion of the second chamber has a lateral wall that surrounds a longitudinal axis of the degassing device and a bottom wall that is inclined with respect to a longitudinal axis of the degassing device.

35. (New) A degassing device according to claim 34, wherein the downstream portion of the first chamber has a lateral wall that is concentric to the lateral wall of the second chamber.

36. (New) A degassing device according to claim 35, wherein the lateral wall of the downstream portion of the first chamber and the lateral wall of the downstream portion of the second chamber are substantially cylindrical.

37. (New) A degassing device according to claim 33, wherein the downstream portion of the first chamber has a cross-section that is substantially the same as the cross-section of the passageway between the first and the second chamber.

38. (New) A degassing device according to claim 33, wherein the downstream portion of the first chamber is substantially conical and the passageway between the first and the second chamber opens at the tip of the cone.

39. (New) A degassing device according to claim 38, wherein the passageway between the first and the second chamber opens in the second chamber close to a wall delimiting an upstream portion of the second chamber.

40. (New) A degassing device according to claim 33, wherein the first chamber comprises an upstream portion having a decreasing cross section.

41. (New) A degassing device according to claim 33, wherein the first chamber comprises an upstream portion having an increasing cross section.

42. (New) A degassing device according claim 33, wherein the second chamber comprises an upstream portion extending above the passageway that has a decreasing cross-section, with a larger cross-section that is substantially level with the passageway and a smaller cross-section that is substantially level with the hydrophobic membrane.

43. (New) A degassing device according to claim 42, wherein the upstream portion of the second chamber is substantially frusto-conical.

44. (New) A degassing device according to claim 33, wherein the outlet port opens in the downstream portion of the second chamber at a location furthest to the passageway.

45. (New) A degassing device according to claim 33, wherein a ratio of a diameter of the passageway to a diameter of the second chamber at the level of the passageway is comprised between about 0,2 and about 0,5.

46. (New) A degassing device according to claim 33, wherein the first chamber of the degassing device has a downstream portion having a cross-section selected with respect to a maximal flow

rate of a liquid in a circuit connected to the degassing device so that a velocity of the liquid in the downstream portion of the first chamber is less than a predetermined velocity.

47. (New) A degassing device according to claim 46, wherein the cross-section of the downstream portion of the first chamber is selected with respect to a maximal flow rate of a liquid of about 500ml/min in a circuit connected to the degassing device so that the velocity of the liquid in the downstream portion of the first chamber is less than about 3m/min.

48. (New) A degassing device according to claim 33, wherein a cross-section of the second chamber of the degassing device at the level of the passageway is selected so that the ratio of a velocity of a liquid within a downstream portion of the first chamber to a velocity of the liquid within the second chamber at the level of the passageway is more than a determined value.

49. (New) A degassing device according to claim 48, wherein the cross-section of the second chamber of the degassing device at the level of the passageway is selected so that the ratio of the velocity of the liquid within the downstream portion of the first chamber to the velocity of the liquid within the second chamber at the level of the passageway is at least about 2.

50. (New) A degassing device according to claim 33, wherein the downstream portion of the second chamber forms an overflow for a fluid flowing from the first chamber into the second chamber.

51. (New) A degassing device according to claim 33, wherein the first chamber, the second chamber and the passageway therebetween are arranged with respect to each other so that a flow pattern of a liquid flowing from the first chamber, through the second chamber and to the outlet port comprises a component that is tangential to the membrane.

52. (New) A degassing device according to claim 51, wherein the flow pattern of a liquid flowing from the first chamber, through the second chamber and to the outlet port comprises an umbrella like component.

53. (New) A degassing device according to claim 33, wherein the first chamber, the second chamber and the passageway therebetween are arranged with respect to each other so that a flow of liquid flowing from the first chamber, through the second chamber and to the outlet port keeps gas bubbles in motion along an inner surface of the hydrophobic membrane.

54. (New) A degassing device according to claim 33, further comprising an inlet port for the infusion of liquid.

55. (New) A degassing device according to claim 33, further comprising a pressure measurement port for connection to a pressure sensor.

56. (New) A degassing device according to claim 33, further comprising a protective member for protecting the hydrophobic membrane against external blows and for limiting the deformation of the hydrophobic membrane when the pressure of the liquid within the degassing device exceeds a limit.

57. (New) A degassing device according to claim 33, wherein the hydrophobic membrane is arranged in a plane substantially perpendicular to a longitudinal axis of the degassing device.

58. (New) End-cap assembly for a filtration device including a filtration membrane arranged in an elongated housing, the end-cap assembly comprising:
- an end-cap having:
    - an end wall having a central axis,
    - a peripheral wall surrounding the end wall, for connection to an end of the housing, and
- a degassing device according to one of the claims 33 to 57 connected to the end-cap so that the first chamber of the degassing chamber is in fluid communication with an interior of the en-cap.

59. (New) End-cap assembly according to claim 58, wherein the degassing device has a longitudinal axis that coincides with the central axis of the end wall of the end-cap and the first chamber has a wall directly connected to the end wall of the end-cap.

60. (New) End-cap assembly according to claim 59, wherein the end wall of the end-cap is substantially annular and the wall of the first chamber has circular cross section decreasing from a first end of larger section, by which the first chamber is connected to the end wall of the end cap, to a second end of smaller cross section forming the passageway between the first chamber and the second chamber.

61. (New) End-cap assembly according to claim 58, wherein the degassing device has a longitudinal axis that is substantially parallel to and spaced apart from the central axis of the end wall of the end-cap, and the end cap assembly further comprises a lateral nozzle for connecting an interior of the end-cap to an inlet of the first chamber of the degassing device.

62. (New) End-cap assembly according to claim 61, wherein the first chamber has a wall having circular cross section increasing from a first end of smaller section, which forms the inlet of the first chamber, to a second end of larger cross section, which forms the passageway between the first and the second chamber.

63. (New) Filtration device comprising:
- an elongated housing;
- a filtration membrane arranged in the elongated housing;
- an end-cap assembly connected to the elongated housing, the end-cap assembly comprising:
    - an end-cap having:
        - an end wall having a central axis,
        - a peripheral wall surrounding the end wall, for connection to an end of the housing, and
    - a degassing device according to one of the claims 1 to 25 connected to the end-cap so that the first chamber of the degassing chamber is in fluid communication with an interior of the en-cap.

64. (New) Filtration device according to claim 63, for the extracorporeal treatment of blood.

65. (New) A degassing device comprising:

- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane; and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, the second chamber has a downstream portion that extends below the passageway and asymmetrically surrounds the downstream portion of the first chamber, and the downstream portion of the second chamber has a lateral wall that surrounds a longitudinal axis of the degassing device and a bottom wall that is inclined with respect to a longitudinal axis of the degassing device.

66. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane;
    - an outlet for discharging the liquid; and
- a wall delimiting an upstream portion of the second chamber,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway that opens in the second chamber close to the wall delimiting an upstream portion of the second chamber, the downstream portion of the first chamber is substantially conical, the passageway between the first and the second chamber opens at the tip of the cone, and the second chamber has a downstream portion that extends below the passageway and asymmetrically surrounds the downstream portion of the first chamber.

67. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, the second chamber comprises an upstream portion extending above the passageway that has a decreasing cross-section, with a larger cross-section that is substantially level with the passageway and a smaller cross-section that is substantially level with the hydrophobic membrane, and the second chamber has a downstream portion that extends below the passageway and asymmetrically surrounds the downstream portion of the first chamber.

68. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, and a ratio of a diameter of the passageway to a diameter of the second chamber at the level of the passageway is comprised between about 0,2 and about 0,5.

69. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, and the downstream portion of the first chamber has a cross-section selected with respect to a maximal flow rate of a liquid in a circuit connected to the degassing device so that a velocity of the liquid in the downstream portion of the first chamber is less than a predetermined velocity.

70. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and

- a second chamber having:
    - an opening closed by a hydrophobic membrane and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, and a cross-section of the second chamber of the degassing device at the level of the passageway is selected so that the ratio of a velocity of a liquid within a downstream portion of the first chamber to a velocity of the liquid within the second chamber at the level of the passageway is more than a determined value.

71. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane; and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, the second chamber has a downstream portion that extends below the passageway and asymmetrically surrounds the downstream portion of the first chamber, and the first chamber, the second chamber and the passageway therebetween are arranged with respect to each other so that a flow pattern of a liquid flowing from the first chamber, through the second chamber and to the outlet port comprises a component that is tangential to the membrane.

72. (New) A degassing device comprising:
- a first chamber having an inlet for a liquid; and
- a second chamber having:
    - an opening closed by a hydrophobic membrane; and
    - an outlet for discharging the liquid,

wherein the first chamber has a downstream portion that partially extends within the second chamber and communicates therewith by a passageway, and the first chamber, the second chamber and the passageway therebetween are arranged with respect to each other so that a flow

of liquid flowing from the first chamber, through the second chamber and to the outlet port keeps gas bubbles in motion along an inner surface of the hydrophobic membrane.